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2. Ansøgers/fuldmægtigs referencenr.:  
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3. International indleveringsdag:  
Internationalt ansøgningsnr.:

☐ Kapitel I  
☐ Kapitel II

4. Ansøger (fulde navn og adresse): ☐ Flere ansøgere på side 2

Novo Nordisk A/S  
Novo Allé  
DK-2880 Bagsværd

Telefon: 4444 8888

Telefax: 4449 3256

5. Fuldmægtig (navn og adresse):

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14. Dato og underskrift:  
Bagsværd, 1997-12-2

*Paul Shenker*  
Paul Shenker

Novo Nordisk A/S

Pat ntdirekt rat t

Helgeshøj Allé 81  
DK-2630 Taastrup  
Telefon 43 50 80 00  
Telefax 43 50 80 01  
Postgiro 8 989923



31-07-2002

Fig. nr. \_\_\_\_\_ ønskes publiceret sammen med sammendraget.

15/3/97

Patented 02-08-2002

ODOC

PATENTDIREKTORAT

98962529-FR9802805

23 DEC 1997 15 13 / 97

Titl : Hair dyeing composition comprising a laccase.

BILAG: .....

## FIELD OF THE INVENTION

- 5 The present invention relates to a hair dyeing composition comprising a laccase.

## HAIR DYEING COMPOSITIONS

- 10 Hair dyeing compositions of the invention comprising a laccase are exemplified below.

## Laccases

- 15 The laccase (E.C. 1.10.3.2) comprised in a hair dyeing composition of the invention may be any of the laccases below:

- 20 The laccase comprised in the hair dyeing composition of the invention may be derived from a strain of *Polyporus* sp., in particular a strain of *Polyporus pinsitus* or *Polyporus versicolor*, or a strain of *Myceliophthora* sp., e.g. *M. thermophila* or a strain of *Rhizoctonia* sp., in particular a strain of *Rhizoctonia praticola* or *Rhizoctonia solani*, or a strain of a *Rhus* sp., in particular *Rhus vernicifera*.

- 25 In a specific embodiment the laccase is a *Polyporus* sp. laccase especially the *Polyporus pinisitus* laccase (also called *Trametes villosa* laccase) described in WO 96/00290 (from Novo Nordisk Biotec, inc.) or a *Myceliophthora* sp. laccase especially the *Myceliophthora thermophila* laccase  
30 described in WO 95/33836 (from Novo Nordisk Biotech Inc).

- Further, the laccase may be a *Scytalidium* sp. laccase, such as the *S. thermophilum* laccase described in WO 95/33837 (from Novo Nordisk Biotech inc.) or a *Pyricularia* sp. laccase, such  
35 as the *Pyricularia oryzae* laccase which can be purchased from SIGMA under the trade name SIGMA no. L5510, or a *Coprinus* sp.

laccase, such as a *C. cinereus* laccase, especially a *C. cinereus* IFO 30116 laccase, or a *Rhizoctonia* sp. laccase, such as a *Rh. solani* laccase, especially the neutral *Rh. solani* laccase described WO 95/07988 (from Novo Nordisk A/S) having a pH optimum in the range from 6.0 to 8.5.

The laccase may also be derived from a fungi such as *Collybia*, *Fomes*, *Lentinus*, *Pleurotus*, *Aspergillus*, *Neurospora*, *Podospora*, *Phlebia*, e.g. *P. radiata* (WO 92/01046), *Coriolus* sp., e.g. *C. hirsutus* (JP 2-238885), or *Botrytis*.

#### EXAMPLES of HAIR DYEING COMPOSITIONS

The term "laccase" used in the below specific hair dyeing compositions means that any of the above specific laccases may be employed.

#### Color cream emulsion A:

		% w/w
20	Cetyl-/Stearyl alcohol (30:70)	6
	cocofatty alcohol (C <sub>12</sub> -C <sub>18</sub> )	2
	Cetyl-/Stearyl alcohol-polyglycoether (20EO)	2
	oxidative dye precursor	1
25	laccase	0.001 - 10
	water	to 100

#### Color cream emulsion B:

30	Lauryl-/Myristyl alcohol (30:70)	10
	Fatty alcohol (C <sub>12/14</sub> )-ethersulphate (2EO)	
	as sodium salt in a 28% water solution	25
	Sodium sulphite	1
	ammonium sulphate	1
35	oxidative dye precursor	1
	laccase	0.001 - 10

Printed: 02-08-2002

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water

to 100

## Color composition in two compartments C:

2	1/ dye precursor	1
5	ethan 1 (96%)	10
	water	to 100
	2/ Laccase	100

0.001 to 10% of 2/ is added to 1/

10

## Broad range color composition in two compartments D:

	1/ Dye precursors and couplers	0.1 to 4.0
	Ethanolamine (or aminomethylpropanol	
15	or sodium bicarbonate)	1.0 to 5.0 (pH 8.5 to 10.0)
	SDS or cocamidopropyl	2.0 to 10.0
	Lauramide DEA or cocamide MEA	1.0 to 5.0
	Propylene glycol or isopropanol	2.0 to 10.0
	Oleic acid or citric acid	depend on pH wanted
20	Sodium sulfite	0.05 to 0.20
	water	to 100
	2/ Laccase	100

25 0.001 to 10% of 2/ is added to 1/

## Broad range color composition in two compartments E:

	1/ Dye precursors and couplers	0.1 to 4.0
30	Sodium acetat /acetic acid	pH 6.0 to 7.5
	SDS or cocamidopropyl	2.0 to 10.0
	Lauramide DEA or cocamide MEA	1.0 to 5.0
	Propylene glycol or isopropanol	2.0 to 10.0
		%w/w
35	Sodium sulfite	0.05 to 0.20
	water	to 100

31-07-2002

Printed 02-03-2002

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2/ Laccase 100

0.001 to 10% of 2/ is added to 1/

5

Gel color composition in two compartments F:

1/ Dyeprecursors, e.g.:

	4-aminophenol	1.0
10	alfa-naphthol	0.4
	3-amino-6-methyl-phenol	0.4
	2.6-diamino-3-(3'-azopyridyl)-pyridin	0.3
	resorcin	0.1
15	2.5-diaminotoluol-sulphate	0.1
	Oleic acid	15.0
	Isopropanol	8.0
	Glycerin	3.0
20	Ascorbic acid	0.3
	Sodium bisulfite	0.1
	Water	to 100

2/ Laccase 100

25

0.001 to 10 % of 2 is mixed with 1/

30 Foaming color gel when mixed with water for covering grey hair

without ammonia, composition G:

	p-Phenylenediamine sulfate	11.40%
	p-Aminophenol	qs
35	m-Phenylenediamine sulfate	1.50
	4-Chlororesorcinol	10.00

	T trasodium EDTA	1.60
	Erythorbic acid	3.00
	Carrageenan ( <i>Chondrus crispus</i> ) (and) xanthan gum	
	(and) s dium lauryl sulfat	22.00
5	Monohydrate s dium perb rate	25.00
	Sodium chloride	to 1 00.00

**Procedure:** Combine all powders and mix until homogeneous.

- 10 Use: mix 1 part powder to 10 parts water containing 0.001 to 10% laccase.

**Shampoo-in Hair Dye, composition H:**

- 15 Liquid permanent hair dyes give a conditioning foaming gel when mixed with oxidant. Covers grey hair.

		%w/w
	A. Butylene glycol (and) laureth-8 (and) laureth-3	
20	(and) cetrimonium chloride	73.00%
	Ammonium acetate	1.00
	B. Oxidation hair dyes	qs
	C. Ammonia, 20%	qs
	D. Water	qs 100. 00

25

**Procedure:** Combine A in mixing vessel. Add B. Rinse container with

amount of water required for given shade. Add C. Close vessel and stir moderately, avoiding foam, to dissolve

- 30 B. Don't open the mixing tank to avoid losing C.

**Dilution prior to use:** Mix 1 part shampoo-in dye with 1 part solution containing 0.002 to 20 % laccase.

35

# Conditioning Color-Enhancer Shampoo, color composition J:

Restores color and shine of colored hair.

5	A. Laureth-8 (and) cocotrimonium chloride (and) butoxy-ethanol (and) PEG-7 glyceryl cocoate (and) quaternium-80	8.00%
	B. Semi-permanent hair dyes	qs
	C. Water	qs 100.00
10	D. Sodium laureth sulfate, 28%	8.00
	E. Cocamide DEA	4.00
	Sodium lauroyl sarcosinate	15.00
	F. Polyquaternium-10	1.20
	Imidazolidinyl urea (and) methylparaben (and) propylparaben sodium salt	0.30
15	Laccase	0.001 to 10
	G. Quaternium-80	0.50
	H. Citric acid, to pH = 6.0+/-0.1	qs

20

**Procedure:** Dissolve B in A under stirring. Heat C to 70 degr.C - 80 degr.C; add to AB. Add D, then E, slowly. When homogeneous, disperse F. At room temperature, add G after homogenization. Adjust pH with H.

25

Basic hair dye formulation, composition K:

	Polyglyceryl-4 oleyl Ether	6.0
	Polyglyceryl-2 oleyl Ether	4.0
30	Oleic acid	3.0
	Oleyl alcohol	5.0
	Oleoamide DEA	7.0
	Laurylamino succinate of diaminopropylene, sodium salt	
	3.0	
35	Oleic acid diethanolamide	12.0
		%w/w



	Propyl neglycol	3.5
	Ethan 1 (96%)	7.0
	Propyleneglycol monomethylenether	9.0
	Sodium metabisulfite	0.5
5	Ammonium ac tat	0.8
	Antioxidants, sequestrants, fragrance, preservatives	
	q.s.	
	Monoethanolamine	to pH 9.8
	Dye precursors are added each as	0.3 to 0.7%
10	Water	to 100

To this formulation laccase is added as 0.001 to 10% w/w before use.

15

Color composition L:

	Octyldodecanol	8.0
	Oleic acid	20.0
20	Laurylether sulphate monoethanolamin	3.0
	Ethanol	10.0
	Benzol	10.0
	Cetylstearyl alcohol 33 M oxidized ethylene	
	2.4	
25	60% cationic polymer	2.2
	Monoethanolamine	7.5
	Diethanolamide linoic acid	8.0
	Ammonia as 20%	10.2
	Disodium ethylene diaminotetraacetic acid	
30	0.3	
	Sodium metabisulfite as 35%	0.5
	Dye precursors	each from 0.2 to 1.2
	Water	to 100.0

35 To this formulation laccase is added as 0.001 to 10% w/w before use.

## Color comp sition M:

	Isopropanol	5.0
5	1.2-propanediol	2.0
	Polyethyleneglycol (20) stearylether	
	1.4	
	Glycerin	1.0
	Disodium ethylene diaminotetraacetic acid	
10	0.3	
	Ascorbic acid	0.1
	Dye precursors	each from 0.2 to 1.2
	Borate buffer 0.1 M	to 100
	pH adj w. NaOH	to 7.7

15

To this formulation laccase is added as 0.001 to 10% w/w before use.

## Color composition N:

20

	Isopropanol	5.0
	1.2-propanediol	2.0
	Polyethyleneglycol (20) stearylether	
	1.4	
25	Glycerin	1.0
	Disodium ethylene diaminotetraacetic acid	
	0.3	
	Ascorbic acid	0.1
	2-amino-6-chloro-4-nitrophenol	0.075
30	Dye precursors	each from 0.2 to 1.2
	Borate buffer 0.1 M	to 100
	pH adj w. NaOH	to 7.7

To this formulation laccase is added as 0.001 to 10% w/w before use.

35

Color composition O:

g

	Sodium hydroxide	0.4
	Hydroxyethylcellulose	0.350
5	Disodium ethylene diamine tetraacetic acid	0.3
	Boric acid	0.280
	Ascorbic acid	0.1
	Dye precursors	each from 0.2 to 1.2

10

To this powder formulation is added water until 100 g plus the laccase as 0.001 to 10% w/w before use.

15 Color cream composition P:

%w/w

	Dye precursors	each from 0.2 to 1.2
	Cetanol	6.0
20	Oleyl alcohol	5.0
	Polyoxyethylene cetyl ether (15 E.O.)	7.0
	Liquid paraffin	10.0
	Stearyltrimethylammonium chloride	1.0
25	Propylene glycol	2.0
	Disodium editate	0.2
	Thioglycolic acid	0.1
	Laccase	0.001 - 10
	Monoethanolamine plus water	pH adj to 8.5 to
30	100	

Color gel composition Q:

35	Dye precursors	each from 0.2 to 1.2
	Sodium carboxymethyl cellulose	7.5

Thi glyc lic acid	0.1
Laccase	0.001 - 10
Water	to 100

5

Color cream composition R:

	Dye precursors	each from 0.2 to 1.2
	Cetanol	6.0
10	Oleyl alcohol	5.0
	Polyoxyethylene cetyl ether (15 E.O.)	
	7.0	
	Polyoxyethylene cetyl ether (10 E.O.)	
	3.5	
15	Liquid paraffin	10.0
	Stearyltrimethylammonium chloride	1.0
	Liquid lanolin	1.0
	Disodium editate	0.2
	Ascorbic acid	0.2
20	Laccase	0.001 - 10
	NaOH plus water	pH adj to 7.5 to 100

Treatment type color composition S:

25

	Dye precursors	each from 0.2 to 1.2
	Cetyltrimethylammonium chloride	2.5
	Stearyltrimethylammonium chloride	1.0
	Isopropyl myristylate	7.0
30	Cetanol	5.0
	Stearyl alcohol	2.0
	Liquid paraffin	4.0
	Liquid lanolin	0.5
	propylene glycol	0.5
35	Thioglycolic acid	0.1
	Laccase	0.001 - 10

NaOH and Water adjusted pH 7.5

to 100

Color powder composition T:

5 Dye precursors each from 0.2 to 1.2  
Sodium carboxymethyl cellulose 24.0  
Sodium carbonate 7.36  
Dextrin to 100

10 Before use 6 g of this powder is mixed with water until 50 ml. To this solution laccase is added as 0.001 to 10% w/w.

15 Aerosol type color composition U:

Dye precursors each from 0.2 to 1.2  
Propylene glycol 2.0  
Thioglycolic acid 0.1  
20 Laccase 0.001 - 10  
Phosphate buffer pH 6.5 to 100

This composition is injected into a piston can. An inert propellant is added.

25

Shampoo type color composition V:

30 Dye precursors each from 0.2 to 1.2  
Polyoxyethylene lauryl ether sodium sulphate (3 E.O.) 10.0  
Coconut oil fatty acid amide propyldimethylaminoacetic acid betaine 4.0  
35 Coconut oil fatty acid diethanolamide 5.0

Propylen glycol 1.0  
Phosphate buffer 0.1 M pH 6.5 to 100

To this shampoo laccas is added just bef re use as 0.001 to  
5 10% w/w.

Color composition X: %w/w

10 Dye precursors each from 0.2 to 1.2  
SDS 1.0  
Disodium editate 0.1  
Ascorbic acid 0.4  
Ammonium hydroxide and water pH 7.0 to 100  
15

To this color base water is added just before use in the  
ratio 1:1 then laccase is added as 0.001 to 10% w/w.

20 Color composition Y:

Dye precursors each from 0.2 to 1.2  
Oleic acid 20.0  
Bis-2-hydroxyethylsorbitanamine 9.0  
25 Hydroxyethylstearylamine 6.0  
Propylene glycol 12.0  
Isopropanol 10.0  
Disodium editate 0.3  
Sodium sulfite 0.3  
30 Ammonium hydroxide plus water pH 8.5 to 100

To this composition laccase is added just before use as  
0.001 to 10% w/w

35 Color composition Z:

	Dy precursors	each from 0.2 to 1.2
	Liquid paraffin	5.0
	Lanolin alcohol	2.0
	Polyoxyethylene lauryl ether sodium sulphate (3 E.O.)	
5	2.0	
	Lauric acid diethanolamide	5.0
	Thioglycolic acid	0.2
	Disodium editate	0.3
	Phosphate buffer 0.1 M pH 6.5	to 100

10

To this composition laccase is added just before use as  
0.001 to 10% w/w

15

#### Cream color composition A1:

	1. Oleic acid.....	16.0
20	2. Isopropanol.....	16.0
	3. Aqueous ammonia (28%)...	7.0
	4. Oleyl alcohol.....	20.0
	5. Carbitol.....	3.0
	6. Nutrosan ALB Ex Conc....	15.0
25	7. EDTA.....	0.2
	8. Laccase.....	0.001 to 10
	9. Water.....	to 117,0

#### 30 Oil shampoo color composition B1:

%w/w

	1. Oleic acid	18.0
	2. Isopropanol	14.0
	3. Carbitol	4.0
35	4. Propylen glycol	2.0
	5. SDS	3.0

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6.	EDTA	0.2
7.	Aqueous Amm nia (28%) t neutr. Oleic acid	q.s.
8.	Water	35.00
9.	Dy pr cursors	each from 0.2 to 1.2
5 10.	Aqu ous Ammonia (28%) to pH 9.2-9.6	
11.	Laccase....	0.001 to 10
12.	Water.....	to 100

## Color composition C1:

10

	Dye precursors	each from 0.2 to 1.2
	Oleic acid	20.0
	Oleyl alcohol	15.0
	Solulan 5	3.0
15	Propylene Glycol	12.0
	Isopropanol	10.0
	Hampene 100	0.5
	Sodium sulfite	0.5
	Ammonium hydroxide (28%)	10.0
20	water	to 100

To this composition laccase is added just before use as  
0.001 to 10% w/w

## 25 Color composition D1:

	Dye precursors	each from 0.1 to 1.2
	Oleic acid	20.0
	Ethomeen S-12	9.0
30	Cerasynt 303	6.0
	Propylene Glycol	12.0
	Isopropanol	10.0
	Hampene 100	0.5
	Sodium sulfite	0.5
35	Ammonium hydroxide (28%)	10.0
	water	to 100

15

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To this composition laccase is added just before use as  
0.001 to 10% w/w

5 Color composition E1:

	Dye precursors	each from 0.1 to 1.2
	Oleic acid	35.0
	Isopropanol	11.0
10	Polyoxyethylene sorbitan trioleate	9.0
	Polyoxyethylene lauryl ether	5.0
	Water pH adj 9.0 - 9.5	to 100

To this composition laccase is added just before use as  
15 0.001 to 10% w/w

Color composition F1:

20	Stearyl trimethylammonium chloride	0.30
	Isostearyl glyceryl ether	2.00
	Dye precursors	each from 0.1 to 1.2
	Benzyl oxyethanol	5.00
25	Isoprene glycol	10.00
	Lactic acid	3.00
	Sodium hydroxide	0.62
	Hydroxyethyl cellulose	1.00
	Water (aqua)	to 100

30

To this composition laccase is added just before use as  
0.001 to 10% w/w

35 Color composition G1:

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	Oleic acid	10.00
	Oleic acid diethanolamide	8.00
	Ol yl alcoh l	2.00
	P ly xyethylene octyldodecylether	10.00
5	Ethyl alcohol	15.00
	Propylene glycol	10.00
	Polyether modified silicone	1.00
	Glycolipid hydroxypropyl ether	1.00
	Ammonia	to pH 10.0 qs
10	Dye precursors	each from 0.1 to 1.2
	Water	to 100

To this composition laccase is added just before use as  
0.001 to 10% w/w

15

Color shampoo composition H1:

20	C <sub>12-18</sub> fatty alcohol	10.50
	Sodium lauryl ether sulfate	5.00
	Cocoalkyldimethylammonium betaine	3.00
	Polyquaternium-10 (Polymer JR 400)	1.00
	1,3-bis(2,4-Diaminophenoxy) propane	0.01
25	EDTA	0.20
	Sodium sulfate	1.00
	Ammonia solution, 25%	6.00
	Dye precursors	each from 0.1 to 1.2
	Water	qs 100.00

30

To this composition laccase is added just before use as  
0.001 to 10% w/w

35 Dye gel color composition J1:



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	Cocamidopropyl-betain , 30%	12.00
	C12-14 fatty alcohol diglycol ether	12.00
	Oleic acid	14.00
	Isopropyl alcoh 1	14.40
5	1,2-Propanedi 1	1.00
	Dye precursors	each from 0.1
	to 1.2	
	Panthenol	0.30
	Ammonia solution, 25%	7.20
10	Sodium sulfite	0.50
	Ascorbic acid	0.50
	Sodium lauryl sulfate	0.50
	EDTA	0.50
	Ammonium chloride	0.50
15	Protein hydrolysate, 30%	3.00
	Fragrance	0.20
	Laccase	0.001 to 10
	Water	qs 100.00

## 20 Two step color composition K1:

## Developer-coupler mixture:

	Oleic acid	15.00
25	Ethoxylated lauryl alcohol	10.00
	Isopropanol	15.00
	Dye precursors	each from 0.1 to 1.2
	Picramic acid	0.10
	Sodium sulfite	0.50
30	Ammonia solution, 25%	10.50
	Water	qs 100.00

## Oxidizer for use on hair base:

35	Cetyl alcohol	4.00
	Cholesterol	0.10

Sodium laureth sulfat , 25%	1.00
Laccase	0.002 to 20
Water	qs 100

5

## Color shampoo composition L1:

	Di sodium lauryl ethersulfosuccinate, 30%	27.00
	Sodium lauryl sarcosinate, 30%	7.50
10	C9-11 alkyl polyglucoside, 35%	19.00
	Dimethylaurylamineoxide, 35%	6.00
	Laurylhydroxysulfobetaine, 35%	3.50
	PEG-1 60 sorbitan stearate	1.00
	Polysorbate-60	1.00
15	Preservative	0.30
	EDTA	0.50
	Poly(dimethylidilaurylammonium chloride)	0.50
	Citric acid	1.00
	Dye precursors	each from 0.1 to 1.2
20	Laccase	0.001 to 10
	Water	qs 100.00

## Color composition M1:

25

## Developer-coupler mixture

	Dye precursors	each from 0.1 to 1.2
	Geteth-15	3.0
30	Cetostearyl alcohol	8.0
	mineral oil	2.0
	Glutathione	0.2
	Ammonium hydroxide and water to pH 9.5	qs 100

35 Oxidizing solution

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	Laccase	0.002 to 20
	EDTA	0.5
	Cetyl alc hol	2.0
	SDS	1.0
5	Phenacetin	0.1
	Water	qs 100.0

## Color composition N1:

10

	Dye precursors	each from 0.1 to 1.2
	Propylene glycol	10.0
	EDTA	0.30
	Sodium sulfite	0.5
15	Abietic acid	1.00
	Ammonium hydroxide and water pH 10	qs 100

To this composition laccase is added just before use as  
0.001 to 10% w/w

20

To all the following recipes laccase can be added as 0.001  
to 10% w/w in the final dye solution:

25

## Formula 12

## Formula 14

## Formula 16

Oxidative Hair Dye		Hair Dye Air Oxidation	
2,5-Diaminonitrobenzene 0.30%		Component 1	
4-Hydroxy-5-ethoxyindole		0.30	Sodium
30	thiosulfate 1.50%	2,5-diethylpyrrole	1.00
	p-Phenylenediamine 0.40	Sodium sulfite	1.
	1-Methyl-2-hydroxy-4-	Disodium 2-(2-	
	quinolin)-1,3-	Fragrance	0.20
35	aminobenzene 0.10	indanedisulfonate 0.80	Water qs
	Sodium lauryl sulfate 4.20	Monoethanolamine	5.0

Printed 04-08-2002

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Ethoxylat d nonylphenol 1.00

Hydroxym thylcellulose 0.50

Ethylene glyc 1 monobutyleth r 9.50 Water qs  
100.00

5 Sodium metabisuifite 0.45 Component 2

Formula 17

Sequestrant qs Ferrous sulfate 10.00% Gel Hair  
Dye System

10 Water qs 100.00 iPyrogallol 2.  
Glucose 1.00 Petroselinic

acid 1.50%

Water qs 100.00 Propylene

glycol 2.15

15 Sodium

laureth sulfate 4.00

20

Formula 13 Hair Dye With Zeolites

propyl

betaine 3.00

Ethoxylated

25

cocoalkylamine 2.00

aminoethanol 5.  
N,N-bis(2

30 p-Phenylenediamine 1.00% Formula 15

Isopropyl alcohol 10.00 Direct Hair Dye Fragrance

Ammonium hydroxide 12.00 Dye solution\* 7.

Sodium suifite 1.20 Silver chloride 0.80% Ammonium hydroxid , 1  
qs

35 Butylene glycol 10.00 Ammonium hydroxide, 28% 2.  
Water qs 100.00

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	Oleic acid	25.00	Hydr xylamin hydrochloride		0
	Polysorbat 80	1.00	Ethoxylated castor oil	1.00	Resorcinol
	Cetyl alc h l	1.00	Fragrance	0.30 p-	
	T luenediamin	0.2607			
5	Water	qs 100.00	1-Menthol	0.20	p-Aminophenol 0
	Composition 2		Resorcinol	0.10	4-
	Chlororesorcinol		0.0545		
10	Silver zeolites 20.00%		Iron chlorophyll	10.50	1,3-bis(2,4
			diaminophenoxy)		
	Hamamelis extract	80.00	Ethyl alcohol	4.00	
	propane				
15		hydrochloride	0.004		
	100.00	Water	qs 1 00.00	2,4-dichloro-	
3-				aminophenol	0.
				Ammonium	
20				hydroxide, 25%	0.
				Water	qs 7.
25					
30	Color composition 01:				
	A. Water		44.35%		
	B. Methylparaben		0.20		
	Propylparaben		0.10		
	Guar hydroxypropyl trimonium chloride		1.00		
35	C. Cocoamphocarboxypropionate		8.00		
	Cocamidopropylamine oxide		14.00		

	Cetrimonium chloride	4.00
	Cocamide DEA (Aminol COR-2C) (61)	3.00
	D. Imidazolidinyl ur a	0.20
	E. Citric acid	0.15
5	Dyes	1.00
	Laccase	0.001 to 10
	F. Water	qs 100

10

## Color composition P1:

	Direct Hair Dye Shampoo	%w/w
15	Disodium laurylethersulfosuccinate, 30%	27.00
	Sodium lauryl sarcosinate, 30%	7.50
	C9-11 alkylpolyglucoside, 35%	19.00
	Dimethyl laurylamine oxide, 35%	6.00
	Laurylhydroxysulfobetaine, 30%	3.50
20	PEG- 1 60 sorbitan stearate	1.00
	Polysorbate 60	1.00
	Preservative	0.30
	EDTA	0.50
	Polydimethyldiallylammonium chloride	0.50
25	Citric acid	1.00
	Dye precursors	each from 0.1 to 1.2
	Laccase	0.001 to 10
	Water	qs 100.00

30



# Patent Claims

1. Hair dyeing composition comprising a laccase.

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2. The hair dyeing composition according to claim 1, wherein the laccase is derived from *Polyporus* sp., such as a *Polyporus pinisitus* laccase (also called *Trametes villosa* laccase) described in WO 96/00290 (from Novo Nordisk Biotec, inc.), or *Myceliophthora* sp. especially the *Myceliophthora thermophila* laccase described in WO 95/33836 (from Novo Nordisk Biotech Inc), or *Scytalidium* sp., such as the *S. thermophilum* laccase described in WO 95/33837 (from Novo Nordisk Biotech inc.), or *Pyricularia* sp., such as the *Pyricularia oryzae* laccase which can be purchased from SIGMA under the trade name SIGMA no. L5510, or *Coprinus* sp., such as a *C. cinereus* laccase, especially a *C. cinereus* IFO 30116 laccase, or *Rhizoctonia* sp., such as a *Rh. solani* laccase, especially the neutral *Rh. solani* laccase described WO 95/07988 (from Novo Nordisk A/S).